2°)

a- $U_{1m} = 25$ V

$U_m = 25$ V

b- $T = 40.0{,}2\,\pi\,10^{-3} = 8\,\pi.10^{-3}$s

$\omega = \frac{2\pi}{T} = 250$ rad s^{-1}

c- $\Delta t = \frac{T}{4}$ $\quad |\Delta\varphi| = \frac{\pi}{2}$

u_1 en avance % à u(t) $\quad \varphi_{u1} - \varphi_u = \frac{\pi}{2}$

d- $\varphi_{u1} = \varphi_u + \frac{\pi}{2} = -\frac{\pi}{4} + \frac{\pi}{2} = \frac{\pi}{4}$

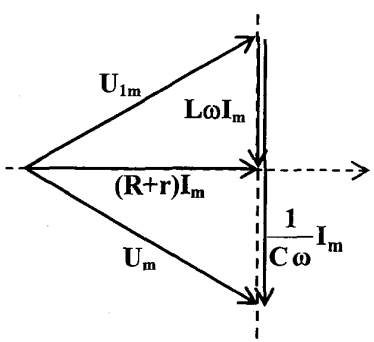
3°)

a- Loi des mailles :

$$u_B(t) + u_R(t) + u_c(t) = u(t)$$

$$L\frac{di}{dt} + (R + r)i + \frac{1}{c}\int i\,dt = u(t)$$

b-



c- $(R + r)I_m$ represente dans **2,5cm** comme $L\omega I_m$ donc $L\omega = (R + r)$

d- $\begin{cases} (R + r) = L\omega \\ R + r = 250\ \Omega \end{cases}$

Ou bien $\text{tg}\left(\frac{\pi}{4}\right) = \frac{L\omega}{R+r} = 1 \rightarrow L\omega = R + r$

$$U_{1m} = Z_1 I_m = \sqrt{(R+r)^2 + (L\omega)^2}$$

$$= \sqrt{2\,(L\omega)^2}\, I_m$$

$$U_{1m} = L\omega\sqrt{2}\, I_m$$

$$I_m = \frac{U_{1m}}{L\omega\sqrt{2}} = \frac{25}{250\sqrt{2}} = 0{,}07\text{A}$$

$$\text{tg}\left(\frac{\pi}{4}\right) = \frac{\frac{1}{c\,\omega} - L\,\omega}{(R+r)}$$

$$\frac{1}{c\,\omega} - L\,\omega = (R + r)\,\text{tg}\left(\frac{\pi}{4}\right)$$

$$\frac{1}{c\,\omega} = L\,\omega + (R + r)\,\text{tg}\left(\frac{\pi}{4}\right)$$

$$C = \frac{1}{L\,\omega^2 + \omega\,(R+r)\,tg\left(\frac{\pi}{4}\right)} = 8.10^{-6}\text{ F}$$